JOURNAL

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Breakthrough technology fights power outages

Imagine interstate power systems where cascading outages like those in the U.S. Northeast last summer are things of the past. Imagine a system where the skills of human operators link with blink-of-the-eye technology to deliver electricity so reliably you'd never give it a second thought.

That day may not be far off thanks to work being done by engineers at the Bonneville Power Administration and the Pacific Northwest National Laboratory. They are close to achieving new levels of reliability for Western states linked via the Pacific Northwest-Pacific Southwest Intertie – the high voltage transmission line that runs from the Northwest to Los Angeles. Interconnected power grids can easily destroy themselves unless they are controlled. In mere seconds and for obscure reasons, individual components can shut down and disturb other elements hundreds or thousands of miles away, sending whole power grids in several states tumbling down like dominoes.

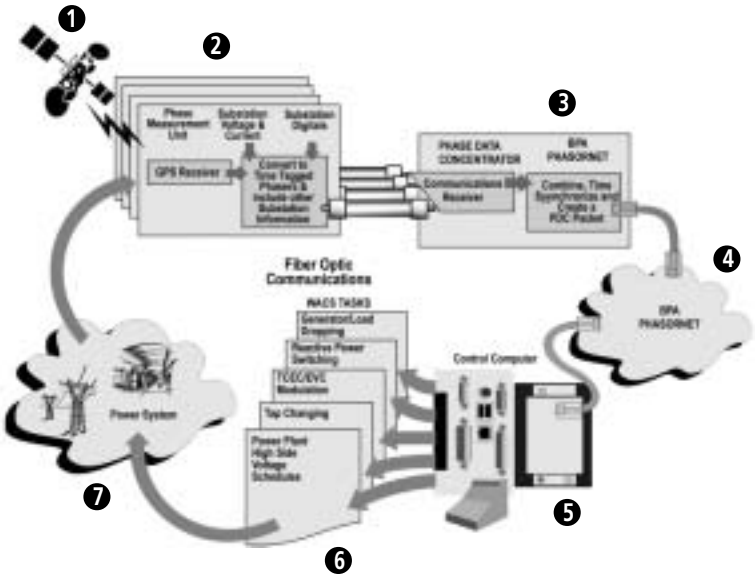
"The transmission lines of the regional system can be thought of like the springs of a mattress. All the various points are connected, from generators to power users," said BPA electrical engineer Bill Mittelstadt. "Because demands constantly change, the whole system is in motion all the time. What happens at one point usually affects the rest. The stiffer the springs, the more reliable is the system. Weaknesses lead to disturbances."

Stiffening a system means upgrading its physical condition – the generators, lines and substations. It also means constant monitoring to address little problems before they become big ones. Sophisticated computer hardware and software are giving grid operators more and faster information and thus better control.

Mittelstadt and a team of engineers including several from the Pacific Northwest National Laboratory in Richland, Wash., pioneered the Wide Area Measurement System (WAMS), a system in which sensors monitor segments of the intertie grid 30 times a second, reporting real-time data that's synchronized through a global positioning system. Centralized computers collect the data to analyze disturbances and improve the tools used to set safe system operating limits. Their information can pinpoint how outages happen, where they start and how well control systems operate.

The newest step will feed information from investigative tools like WAMS into real-time controls that instantly detect potential interstate problems and then help subdue their effects before they cascade out of control. The ideal is to link the capabilities and judgments of human operators with the speed and analytical power of computers as they control interstate grids. It's called the Wide-Area Stability and Voltage Control System (WACS).

BPA's Northwest grid has sensors on every 500-kilovolt transmission line. The sensors detect outages and send signals to adjust the output of power plants or to boost voltage at substations to balance the system in a fraction of a second. But little exists to deal with outages outside



1. *Global Positioning System satellites provide time synchronization signals to WAMS sensors located at substations.*
2. *Measurements collected by all the WAMS units are linked to the same time data.*
3. *Data collectors at control centers chronologically organize data from WAMS units all around the system.*
4. *Concentrated data goes into a private network. It is shown on system operators' display units and enters a control computer.*
5. *If the data indicates a system disturbance…*
6. *The computer can pick from a list of tasks to restore system stability.*
7. *The task is applied to the power system, and WAMS units measure and report on the results.*

the BPA grid; outages that can spread their impacts through the interconnected system – that set of springs – to points inside BPA's system.

"It would be like having devices available to adjust the tension on the springs or prop up weak sections to prevent failures," said Carson Taylor, BPA's principal engineer for transmission and one of the architects of WACS. Taylor observed that both WAMS and WACS would certainly have helped the Northeastern United States last summer.

"Sometimes events happen so fast that even the best operator can't react quickly enough to stop them," Taylor said. "This is where high-speed controls could take over, instantly analyzing troublesome trends, projecting their possible outcomes and initiating protection schemes to offset the problems." Theoretically a major disturbance at one end of the set of springs would no longer threaten the stability at the other end.

Taylor thinks the proof and implementation may take only two years. And, he suggested, such a system might provide smarter and lower cost controls within the BPA grid as well.

Following last summer's Northeast blackout, the North American Electric Reliability Council recommended that East Coast grid operators adopt measuring and time-synchronized monitoring systems like the BPA-developed WAMS. Taylor sees wide-area control, with a system like WACS, as a natural extension.

White book reflects uncertainty

BPA expects to have an energy surplus this year and deficits of fewer than 100 average megawatts through 2008 – under one set of assumptions. But uncertainties about BPA loads after 2006 make for a wide range of possible outcomes. Uncertainties include actual BPA power deliveries to the region's investor-owned utilities and the potential level of BPA sales to direct-service industries. About 800 megawatts of BPA's existing power obligations to publicly owned Northwest utilities have no signed contracts after 2006.

Given these uncertainties, BPA's latest White Book – the Pacific Northwest Loads and Resources Study – shows four scenarios to portray possible outcomes for BPA's load-resource balance over the next two decades. The White Book is BPA's official projection of long-term loads and resources. It shows the region as a whole with energy surplus through 2011 but with a possible deficit in 2012 of 157 average megawatts and more than 670 aMW by 2013, based on existing power plants. The principal uncertainty for the region is what proportion of the new generating capacity built in the region in the last few years is dedicated to serving Northwest load.

Standard & Poor's: "stable outlook" for BPA-backed bonds

Citing BPA actions to improve its financial position, Standard & Poor's Ratings Services has upgraded its outlook for $6.3 billion in Energy Northwest and other bonds backed by BPA from negative to stable. The improved outlook widens financial market access and reduces financing costs.

"The stable outlook reflects the fact that actions we've taken to restore our financial health are being positively recognized," said Steve Wright, BPA administrator. "This action will reduce the costs of financing vital infrastructure projects that benefit Northwest ratepayers."

When BPA's cash reserves fell from $811 million to $188 million at the end of fiscal 2002, Standard & Poor's issued a negative outlook on BPA-backed AA-minus bonds. Customer demands to avoid rate increases by using the proceeds of debt refinancing to pay current expenses tainted BPA's financial picture, the report stated. Standard & Poor's credited BPA's Safety Net Cost Recovery Adjustment Clause with its improved credit outlook.

A Northwest grid Rx

Members of the Regional Representatives Group have developed a consensus on the problems they face *and* on a general approach to a proposed solution. The RRG is a public forum convened by Northwest utilities that have been considering whether and how the Northwest might form a regional transmission organization. Members include representatives of Northwest publicly owned and investor-owned utilities, public utility commissions, tribes, states and public interest groups.

The group's proposal calls for creation of an independent entity to manage the region's transmission grid. Participation would be voluntary. The proposal takes a phased approach to assure benefits to all. Each step would require regional consultation.

The idea is that many regional transmission problems and opportunities can be addressed by a single organization that would make decisions from the perspective of the whole transmission system. The goals are to improve transmission grid efficiency; improve the region's ability to build only necessary infrastructure in the least-cost way; and enhance the Northwest's ability to secure the lowest cost energy supplies for its consumers.

"The region could benefit from a one-utility approach to transmission planning and operation, if it's done carefully," said BPA's Allen Burns. "We are committed to participating in a regional entity only if it meets our principles."

So far in 2004, the RRG has laid out a four-step process to reach the beginning state of an independent entity. See: *http://www.rtowest.com/RRG_Main.htm* for details.

PUBLIC INVOLVEMENT

Updates and Notices

ENERGY EFFICIENCY – ONGOING PROJECTS

Annual Review of the Conservation and Renewables Discount (C&RD) Program – Regionwide

The annual review process in the C&RD Manual prescribes the BPA Energy Efficiency group to solicit comments for improvements in the program. For fiscal year 2005 the comment period began Jan. 5 and is open until March 31, 2004. After that date, all comments will be compiled in one document for a 30-day public review before final decisions will be made. Comments are welcome for both the manual and/or technical components of the C&RD. For instructions on submitting recommendations, call (503) 230-7669. Electronic recommendations are accepted at the Web site listed below.

Copies of the C&RD Manual are on the web at *http://www.bpa.gov/Energy/N/projects/cr_discount/index.shtml*. This site also provides a link to the Regional Technical Forum, which has a list of the currently approved efficiency measures. *(See close of comment.)*

FISH AND WILDLIFE – ONGOING PROJECTS

Grande Ronde and Imnaha Spring Chinook Project EIS – Wallowa and Union counties, Ore.

Fish trapping, incubation, rearing and release hatchery facilities are proposed to help boost spring chinook salmon populations in the Grande Ronde and Imnaha river basins of Northeast Oregon. Planned facilities would modify and augment existing Lower Snake River Compensation Plan facilities. The DEIS is available on CD, in hard copy or online at *http://www.efw.bpa.gov* under links to environmental analysis/planning and active projects. Public review and comment period ended July 7, 2003. Responses and an FEIS are being prepared.

Methow Valley Irrigation District Supplemental EA – Okanogan County, Wash.

BPA proposes to fund a fish screen replacement project for the Methow Valley Irrigation District in Okanogan County, Wash. The proposed screen replacement improvements, located on the Twisp and Methow rivers, are related to a proposal to rehabilitate the MVID irrigation system. BPA prepared an EA and FONSI for the larger proposal in 1997. BPA issued a preliminary EA for the current fish screen replacement proposal Dec. 4, 2003. Public comment period closed Jan. 2, 2004. A final EA and FONSI will be completed in March. The final EA will be available on BPA's Web site at *http://www.efw.bpa.gov/cgi-bin/PSA/NEPA/SUMMARIES/MethowValley*.

Salmon Creek EIS – Okanogan County, Wash.

BPA proposes to fund a project to enhance fish habitat and passage and to increase instream flows in 4.3 miles of lower Salmon Creek, a tributary of the Okanogan River. The project would rehabilitate the stream channel, revegetate stream banks and increase streamflows. A DEIS is scheduled for release in spring 2004.

South Fork Flathead Watershed/Westslope Cutthroat Trout Conservation Program EIS – Flathead National Forest, Mont.

BPA proposes to fund a project to remove exotic trout species from selected lakes in the South Fork of the Flathead drainage. BPA is preparing an EIS. Additional information is available at *http://www.efw.bpa.gov/cgi-bin/efw/E/Welcome.cgi.*

POWER – ONGOING PROJECTS

BPA's Power Supply Role After 2006 – Regionwide

BPA plans to initiate discussions later this spring regarding how BPA will market power and share the costs and benefits of the Federal Columbia Power River System in the Pacific Northwest after 2006. The schedule has not yet been finalized, but the discussions will provide ample opportunity for all interested parties to participate. As details of the process become available, updated information will be posted to BPA's Web site at *http://www.bpa.gov/power/regionaldialogue.*

TRANSMISSION – ONGOING PROJECTS

Bonneville-Alcoa Access Road Project EA – Skamania County, Wash.

BPA proposes to establish a half-mile-long access road along the Bonneville-Alcoa 115-kV transmission line. The proposed road is located approximately 3.5 miles west of Skamania, Wash. The preliminary EA was released in July 2003. The final EA was released in January 2004. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information.

BP Cherry Point Cogeneration Project Interconnection EIS – Whatcom County, Wash.

BP West Coast Products LLC has requested interconnection of its proposed 720-MW combustion turbine project at its Cherry Point Refinery near the community of Birch Bay, Wash. The project may require rebuilding an existing single-circuit 230-kV transmission line to double-circuit from Cherry Point to Custer Substation and is subject to Washington state energy facility siting processes. BPA and Washington EFSEC developed a joint SEPA/NEPA DEIS, which was released September 2003. The comment period for the joint SEPA/NEPA ended Nov. 3, 2003. The final EIS is scheduled for release in March 2004. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information.

COB Energy Facility Interconnect EIS – Klamath County, Ore.

Peoples Energy Resources Corp. has requested interconnection of its proposed 1,200-MW combustion turbine project at a site near Bonanza in Klamath County, Ore. The project would require a new 500-kV transmission line to BPA's Captain Jack Substation. The project is subject to Oregon Energy Facility Siting Council certification. The DEIS was released for public review in November 2003 and the comment period ended Feb. 13, 2004. Public meetings were held Jan. 22, 2004, in conjunction with Oregon EFSC hearings. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information.

Grand Coulee-Bell 500-kV Transmission Line – Spokane and Lincoln counties, Wash.

Construction is under way on the rebuilding of 84 miles of an existing 115-kV wood-pole transmission line with a new, higher capacity 500-kV steel lattice line. The transmission line corridor between the Grand Coulee and Bell substations currently contains two 115-kV transmission lines on two wood-pole structures and three 230-kV transmission lines on two steel lattice structures. The existing transmission lines cannot reliably move power from existing generation sources east of Spokane to the west. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information and construction photos.

Hanford Reach National Monument CCP/EIS – Benton, Franklin and Grant counties, Wash.

BPA is participating as a cooperating agency in a land management planning process led by the U.S. Fish and Wildlife Service. The USFWS seeks to develop a comprehensive conservation plan as required by the Refuge System Improvement Act of 1997. BPA is providing information and writing sections of the plan that pertain to transmission facilities, roads, energy facilities and river flow management within the monument. A DEIS is scheduled for release in late 2004.

Kangley-Echo Lake 500-kV Transmission Line Project – King County, Wash.

The new Kangley-Echo Lake 500-kV transmission line was energized Dec. 31, 2003. The line connects an existing transmission line near Kangley to BPA's Echo Lake Substation in western Washington. The project is needed to improve transmission system reliability and to enhance BPA's ability to meet treaty obligations with Canada. The new nine-mile-long transmission line parallels an existing BPA transmission line in central King County, Wash. Five miles of the line

cross the Cedar River Municipal Watershed, which is the source for much of the city of Seattle's drinking water. BPA and the city of Seattle reached an agreement on the project and maintained a working relationship throughout the project to ensure protection of the watershed during construction. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information and construction photos.

Nisqually Transmission Line Relocation Project EA – Thurston County, Wash.
BPA is proposing to relocate two miles of transmission line corridor off the Nisqually Indian Reservation in Thurston County, Wash. BPA has an existing transmission line corridor across the reservation and a portion of the Fort Lewis military base just north of State Route 510. This corridor contains two transmission lines: the Olympia-Grand Coulee 287-kV line and the Olympia-South Tacoma 230-kV line. This relocation is being proposed because the 50-year easement for one of the lines on the reservation has expired. Public scoping meetings were held Oct. 21 and Oct. 22, 2003. BPA is developing a preliminary EA scheduled for release spring 2004 and the final EA is scheduled for release fall 2004. The scoping comment period ended Nov. 21, 2003. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information.

Raymond-Cosmopolis 115-kV Transmission Line EA – Grays Harbor and Pacific counties, Wash.
BPA proposes to rebuild an existing 115-kV transmission line between Raymond and Cosmopolis, roughly parallel to Highway 101. Most of the 18-mile-long line will remain in the existing right-of-way. The preliminary EA was released for public review in February. Public meetings were held in February and the comment period ended Feb. 26, 2003. The final EA and FONSI were released Sept. 5, 2003. Line construction is scheduled to began in spring 2004 and be completed by fall 2004. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information.

Schultz-Wautoma Area 500-kV Line Project – near Ellensburg to near the Hanford Reservation, Wash.
BPA proposes to build a new 500-kV line from Schultz Substation to the new Wautoma Substation southwest of the Hanford Monument. An FEIS was released in February 2003. The ROD was released in March 2003. Construction on the new Wautoma Substation began May 5, 2003, and is nearly complete. Construction of the Sickler-Schultz portion of the line began February 2004. Fiber construction began in late January 2004. The project will be completed by November 2005. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information and construction photos.

SnoKing Tap to Monroe-Echo Lake Project – Snohomish County, Wash.
This project allowed BPA's existing SnoKing Tap (500-kV constructed) to Monroe-Sammamish 230-kV transmission line to be reconnected to the Monroe-Echo Lake 500-kV transmission line as part of several projects known as the Puget Sound Area Additions. The SnoKing Tap to Monroe-Echo Lake 500-kV transmission line was energized to 500-kV Sept. 29, 2003. The original transmission line was constructed in the 1970s as a 500-kV line but had been operated at 230-kV until recently. An increase in ambient noise levels was anticipated but the level of concern from area residents along the transmission line and in the vicinity of the SnoKing Substation was not. BPA held a public meeting Jan. 27, 2004, to respond to public concern about the voltage and noise increase and to discuss recommendations. See *http://www2.transmission.bpa.gov/PlanProj/Transmission_Projects/* for more information.

Transmission Business Policy EIS – Regionwide
The Business Policy EIS will look at a broad range of policy options for supporting decisions on issues related to the planning, construction, operation, marketing and maintenance of the transmission system. The Business Policy EIS will enhance BPA's understanding of the impacts its transmission policy and planning activities have on the human environment and support the agency's transmission business decisions. The scoping period began in December 2003 and closes March 31, 2004. Public scoping meetings were held Jan. 13, 14, 15, 27 and Feb. 26. See *http://www2.transmission.bpa.gov/PlanProj/* for more information. *(See close of comment.)*

Wanapa Energy Center Generation Project EIS – Umatilla County, Ore.
The Confederated Tribes of the Umatilla Indian Reservation requested interconnection of the Wanapa Energy Center, a proposed 1,300-MW gas-fired combined-cycle combustion turbine project, into the transmission grid. The project would be located on tribal trust land. The Bureau of Indian Affairs released the DEIS in October 2003. BPA is participating as a cooperating agency. Two public meetings were held in December 2003. The comment period ended Dec. 29, 2003. A FEIS is scheduled for March 2004 and a ROD in April 2004. See *http:/www2.transmission.bpa.govPlanProjTransmission_Projects/* for more information.

SUPPLEMENT ANALYSES

Wildlife Mitigation Program EIS:
- SA-39 Albeni Falls Dam Wildlife Mitigation – Kalispell Tribe (Acquisitions; three parcels, 890 acres) – Pend Oreille County, Wash.

Watershed Management Program EIS:
- SA-132 Idaho Model Watershed Habitat Project – Salmon Valley Golf Course. Lemhi County, Idaho
- SA-133 Idaho Model Watershed Habitat Project – Basin Creek AFO. Lemhi County, Idaho
- SA-134 Challis Creek 8/8A (Highline Canal) Fish Screen. Custer County, Idaho

CLOSE OF COMMENT
- March 31, 2004 – Annual Review of the Conservation and Renewables Discount (C&RD) Program
- March 31, 2004 – Transmission Business Policy EIS

CALENDAR OF EVENTS

Business Practices Technical Forum VI
- March 18, 9 a.m. to 3:30 p.m., Parkway Plaza One, Vancouver, Wash.

FERC Order 2003
- March 19, 9 a.m. to Noon, Parkway Plaza One, Vancouver, Wash.

Non-Wires Solutions Round Table Meeting
- April 21 and 22, time to be determined, BPA headquarters, Rates Hearing Room, 905 NE 11th Ave., Portland, Ore.

If you have questions or comments, or you want to be added to the mailing list for any project, call (503) 230-3478 (Portland) or 1-800-622-4519.

To order copies of documents, call: 1-800-622-4520 or (503) 230-7334. Written comments may be sent to: BPA, P.O. Box 14428, Portland, OR 97293-4428. E-mail address: *comment@BPA.gov.* BPA home page: *http://www.bpa.gov.* For details on BPA environmental reviews listed above, including site maps and documents issued to date, see *http://www.efw.bpa.gov/cgi-bin/PSA/NEPA/Projects.* **Process Abbreviations:** EA-Environmental Assessment, EFSEC-Washington Energy Facility Site Evaluation Council, EFSC-Oregon Energy Facility Siting Council, EIS-Environmental Impact Statement, DEIS-Draft Environmental Impact Statement, FEIS-Final Environmental Impact Statement, FONSI-Finding of No Significant Impact, NOI-Notice of Intent, ROD-Record of Decision, SA-Supplement Analysis.

DOE/BP-3568 March 2004